Media Peternakan, April 2013, pp. 70-78
ISSN 0126-0472 EISSN 2087-4634
Accredited by DGHE No: 66b/DIKTI/Kep/2011

Online version:
http://medpet.journal.ipb.ac.id/
DOI: 10.5398/medpet.2013.36.1.70

Analysis of Regional Distribution Capacity and Priorities for Improving Beef Cattle Population in East Nusa Tenggara Province

U. R. Lole[a,*], S. Hartoyo[b], Kuntjoro[b], & I W. Rusastra[c]
[a]Faculty of Animal Husbandry, Nusa Cendana University
Jln. Adisucipto-Penfui, Kupang-East Nusa Tenggara 85361, Indonesia
[b]Faculty of Economics and Management, Bogor Agricultural University
Jln. Kamper, Kampus IPB Darmaga Bogor-West Java 16680, Indonesia
[c]Indonesian Center for Agriculture Socio Economic and Policy Studies
Jln. Ahmad Yani No 70 Bogor-West Java 16161, Indonesia
(Received 01-02-2013; Reviewed 26-02-2013; Accepted 01-04-2013)

ABSTRACT

Cattle farms resources in NTT are potential to be developed, but regency has not used it effectively. As a consequently, a huge disparity of beef cattle deployment between regencies occur. The objectives of the research were: a) to analyze the level of Capacity of Increasing Beef Cattle Population (CIBCP) in each regency, and b) to analyze the priorities of each regency for the development of beef cattle. Methods of the research used maximum potential of land resources (MPLR) and maximum potential of householder (MPNH) equation to analyze the effectiveness of CIBCP for regency. This analysis used to analyze the capacity and priorities. To formulate the beef cattle development policies, analysis of the ratio of the density of population and livestock are used. Conclusions: (a) NTT has a very large capacity to increase beef cattle to about 3.2 times that of the current population (based on land and labor resources), with the existing technology and management. Regency areas with large land resources and labor generally have a large CIBCP. On the other hand, regions with large land resources but small labor resource (or vice versa), have a small CIBCP (depending on the most limited resources), and (b) Scale of the priority regions are not only dominated by the largest number of cows. The number of households and the cultivated land has positive and powerful impacts (compared to pasture areas) to CIBCP effective.

Key words: beef cattle, deployment, regions capacity, priority scale, NTT

ABSTRAK

Sumberdaya peternakan sapi dalam wilayah NTT sangat potensial untuk dikembangkan, namun belum dimanfaatkan secara efektif oleh setiap kabupaten. Akibatnya, terdapat disparitas penyebaran sapi yang sangat besar antar-kabupaten. Penelitian bertujuan: a) Menganalisis tingkat kapasitas penambahan populasi sapi pada setiap kabupaten; dan b) Merumuskan skala prioritas tiap wilayah kabupaten untuk pengembangan sapi. Metode yang digunakan adalah analisis kapasitas peningkatan populasi ternak sapi (KPPTS) Efektif untuk tiap kabupaten menggunakan persamaan potensi maksimum berdasarkan sumberdaya lahan (PMSDL) dan potensi maksimum berdasarkan jumlah kepala keluarga (PMKK). Analisis ini digunakan untuk menganalisis kapasitas dan skala prioritas. Analisis rasio densitas penduduk dan ternak digunakan untuk merumuskan kebijakan pengembangan sapi. Kesimpulan: (a) Kapasitas wilayah NTT masih sangat besar untuk penambahan ternak sapi hingga sekitar 3,2 kali dari populasi saat ini (berdasarkan sumberdaya lahan dan tenaga kerja), dengan tingkat teknologi dan manajemen yang ada. Wilayah kabupaten dengan sumberdaya lahan besar namun sumberdaya tenaga kerja kecil (atau pun sebaliknya), akan memiliki nilai KPPTS efektif yang kecil pula, tergantung pada sumberdaya fisik mana yang paling terbatas; dan (b) Skala prioritas wilayah tidak didominasi wilayah dengan jumlah sapi terbanyak saja. Jumlah kepala keluarga dan lahan garapan berpengaruh positif dan dominan (dibanding luas padang rumput) terhadap KPPTS Efektif.

Kata kunci: sapi potong, penyebaran, kapasitas wilayah, skala prioritas, NTT

*Corresponding author:
E-mail: ulrikus_lole@yahoo.com

INTRODUCTION

Beef cattle business in East Nusa Tenggara Province (NTT) has comparative and competitive advantages. Such of the advantages is the high number of beef and buffalo population that is about 794,205 heads (Ditjennak, 2012). Nevertheless, competitive advantage became weak with the entry of new production regions, strengthening of old production regions, increased imports of beef cattle/beef, and the ineffectiveness of the trading and pricing policies (Talib *et al.*, 2007; Lawalu *et al.*, 2008). This trend should be note, because all of the production regions in Indonesia supplied the same consumption region, namely DKI Jakarta (Ditjennak, 2012). Table 1 shows the trend of population growth, slaughter, exports and the price of cattle in NTT over the last 10 yr (Disnak NTT, 2012). Total cattle population was not fully able to offset the rate of slaughter cattle in NTT and rate of exports out of the NTT. This fact indicated that the depletion phenomenon has emerged from the cattle population.

In fact, comparative advantage has not been fully established and developed in order to take into national consideration. One indicator of this condition is the scale of the beef cattle distribution is not equal at all regencies. This cause a main problem to utilize some potential resources in regencies. Animal distribution mostly in Timor which is approximately 80.0%, and the rest is 8.9% in Sumba and 11.1% in Flores (Disnak NTT, 2012). In NTT, there are regions that assumed have densely beef cattle population, but continues to be developed with the old system and have great government attention. Conversely, there are regions with small number of beef cattle population but received less attention in its development (Basuno, 2004; Talib, 2007). Therefore, in order to make NTT as a production centre with both advantages, all of the potencies of all regions must be revitalized. Decentralization policy will provide the flexibility to prioritize this program. Thus, provincial and regency governments and various related organizations in farm and community economic development should work together (Lawalu *et al.*, 2008). Implementation of government policies need to be synchronized. For example, synchronization between cattle development in "Anggur Merah Program" (budget for wealthy community) of local government and self-sufficient of beef policy (SSBP) that is categorize NTT as a region of cattle development based on intensification of natural mating (INKA) which is less technology.

Therefore, the initial effort to regionalize, deployment, and development of beef beef cattle in NTT needs to be applied through the identification of the physical capability of each regency, so that, in each region can estimate livestock units, including priorities scale (Ditjennak, 2012). If beef cattle distribution and development carried out simultaneously in all regencies, positive effects were; distribution of livestock is more balance, the number of beef cattle farmer increase, farmers' income increases, good raising beef cattle, and funding from various source increases (Yusdja & Ilham, 2004; Lole, 2009).

To provide guidelines for the development and as an empirical argument to the government needs a research to strengthen the operational basis of beef cattle deployment. The first step is by analyzing the physical capability of the region and increases the population capacity of regency. The research is to generate a development of priority scale per regency as a blue print of deployment and development of beef cattle. It is also to determine the performance and potential dynamics of region.

Deployment and development of beef cattle throughout all of the regencies is a strategic step to strengthen its comparative advantages of the regencies. If reinforcement carried out simultaneously and continuously (by all of the stakeholders), NTT could be managed and even enhance the status as a national production centre. Obviously, the main benefit is to increase welfare of farmers and their families from the beef cattle business and related industries. The objectives were: a)

Table 1. The development of the population and the price of cattle/beef in East Nusa Tenggara Province, Indonesia (2000-2011)

Year	Total population of beef cattle (head/yr)	Total population of bull (head/yr)	Total population of productive cow (head/yr)	Total slaughter beef cattel in NTT (head/ yr)	Total export beef cattle from NTT (Jkt) (head/ yr)	Total supply of beef in NTT (ton/yr)	Nominal price of beef cattle in NTT (Rp/kg)	Nominal price of yearling beef cattle in NTT (Rp/head)	Nominal price of beef in NTT (Rp/kg)
2002	503,154	161,009	249,944	29,705	42,410	5,054.0	9,400	4,125	25,000
2003	512,999	177,217	226,520	31,293	35,061	5,324.2	9,500	4,375	30,000
2004	522,930	167,338	256,026	40,111	61,211	6,824.5	10,200	4,375	28,083
2005	533,710	186,676	227,300	40,696	48,619	6,924.0	11,700	4,375	30,000
2006	544,482	174,234	266,579	40,157	61,279	6,832.3	13,900	4,750	30,000
2007	555,383	177,723	271,915	50,166	63,036	8,535.2	15,500	5,125	40,000
2008	566,461	181,268	277,339	40,959	61,889	6,968.8	21,200	5,500	50,000
2009	577,552	202,007	245,453	54,051	58,392	9,196.2	22,700	6,875	55,000
2010	599,279	191,769	293,407	41,449	49,876	7,052.1	24,200	7,375	60,000
2011	794,205	254,146	333,566	58,066	59,670	9,879.3	25,000	8,750	60,000

Source: Disnak NTT 2012 (processed).

to analyze the level of Capacity of Increasing Beef Cattle Population (CIBCP) in each regency, and b) to analyze the priorities of regency for development of beef cattle.

METHODS

Sources and Types of Data

The study was conducted at the entire regency of NTT, using secondary data from various related agencies. Primary data was obtained from the various parties involved in six regencies of the three main islands, through in deep-interview based on questionnaires.

Calculation of the Capacity of Increasing Beef Cattle Population

Analysis of data applied the Maximum Potential of Land Resources (MPLR) equation and Maximum Potential of Householder (MPNH) equation to analyze the effectiveness of CIBCP for regency. This analysis was used to analyze the capacity and priorities. The calculation of the Capacity of Increasing Beef Cattle Population (CIBCP) was based on Land Resources (CIBCP-LR) and the Number of Households (CIBCP-NH) in regency using an Effective CIBCP formula. Effective CIBCP was defined as CIBCP-LR or CIBCP-NH with a small value (Ditjennak, 1995).

Determine of Priority Scale and General Strategy of Development

CIBCP value was the only criteria for determining priorities scale in this study. Although, this method had some weaknesses, it was considered adequate in estimation study. Analysis of the ratio of beef cattle density was used to formulate development policies of beef cattle farm.

RESULTS AND DISCUSSION

Physical, Socio-Cultural, and Economics Capability

With unique geographical conditions among regions, there is a difference of potential physical, socio-cultural, and economic. Synthesize various forms and levels of resource capability into the comparative and competitive advantages of each region, and define the level of regional competitiveness in the development area of beef cattle farm (Table 2).

Physical potential included support of several resources namely land, water, feed, livestock and labor. Potential of land resources included land of natural pasture, pasture upgrade, fodder crops, cultivated food crops, integrated forest, and so forth. Natural pasture degradation of quality continuously occured, because there was no improvement (Ilham, 2006; 2007).

Another important potential resource was wide of cultivated land for food crops with high quality by-product. Evidently, the region with large cultivated land (but has no pasture), was able to support a large number of quality feed for beef cattle. Forage crops (superior grass, legume, trees feed and so on) were also potential, because it was able to produce quality feed. Large carrying capacity of the by-product of food crop and main-product of feed crop was an alternative feed to substitute pasture. These results were in accordance with Sutaryono (2008) who stated that forage in the form of natural grass, leftover crops, bush beans, bananas and papaya trunks, and leaves of trees, were potential feed during the dry season.

Resource capability of beef cattle was quite large, but the main issue was the imbalance between regions and the deployment of beef cattle ownership per household (based on availability of family labor). Approximately 80.0% of beef cattle population spread out in Timor, 8.9% in Flores and 11.1% in Sumba. Beef cattle population drastically declined in the last decade, also inhibits the deployment beef cattle inter-regional efforts and the distribution of beef cattle among households. The stagnant breeding activities were more difficult than the deployment and distribution of beef cattle.

Increase Capacity of Beef Cattle Population and Development Priority Region

Analysis of CIBCP showed various empirical facts (Table 3). These results were important for assessment of opportunities and their impact on the subsequent program (Disnak NTT, 2012). These three regions (Timor, Sumba, and Flores) were analyzed separately, because each had different characteristic. It was important to obtain specific description, both the potential and capacity of the region as well as suitable strategy for the development of beef cattle for each region.

Timor region. Analysis results based on land resources (Table 3) showed that even though technical density of beef cattle in Timor is relatively large, it was not a constraint to develop beef cattle. However, in order to increase the beef cattle population in Belu, land resources was the first constraint to be noted first as compared to the resources of family labor. Technical density of beef cattle in Kupang was very small, because it had the largest area with a relatively large number of beef cattle. On the other hand, technical density of beef cattle in Belu was the greatest, because it had the smallest area with a relatively large number of beef cattle too.

The capacity of land resource (pasture and cultivated land) in Timor was large enough for beef cattle, because many untapped land resources used optimally. Thus, although the land resource was common constraint in beef cattle development in Timor, but it was not an effective constraint that limits increasing capacity of beef cattle population directly. On the other hand, land resource in Belu was a constraint that affects the increasing capacity of beef cattle population directly. Therefore, labor resource per farmer household was not a constraint to increase the capacity of beef cattle in Belu. This was caused by the total population (farmer household) was the largest and the highest population density.

Based on analysis, opinion about Timor as a dense region and requires a restriction of beef cattle were less

Table 2. Population, density, and ownership of beef cattle and other ruminant in East Nusa Tenggara Province, Indonesia, per 2011

No	Area of regency/city	Livestock population (AU)		Technical density of livestock (AU/km^2)		Economical density of livestock (AU/resident)		Livestock ownership per household (AU/HH)	
		Beef cattle	Beef cattle + other rumin.	Beef cattle	Beef cattle + other rumin.	Beef cattle	Beef cattle + other rumin.	Beef cattle	Beef cattle + other rumin.
1	SBA	581	11,701	0.27	5.36	0.01	0.11	0.03	0.58
2	SBD	2,201	20,600	1.49	13.91	0.01	0.08	0.04	0.42
3	STE	1,147	13,178	1.15	7.05	0.03	0.21	0.19	1.16
4	STI	30,766	82,634	4.39	11.80	0.13	0.35	0.67	1.79
	Sumba	*35,695*	*128,112*	*1.82*	*9.53*	*0.50*	*0.19*	*0.23*	*0.99*
5	SRJ	-	-	-	-	-	-	-	-
6	RND	10,923	22,684	8.53	17.71	0.09	0.20	0.38	0.78
7	KMK	2,537	2,930	15.82	18.27	0.01	0.01	0.04	0.05
8	KPG	102,563	123,854	17.40	21.01	0.26	0.31	1.17	1.41
9	TTS	89,420	96,266	22.66	24.39	0.21	0.23	0.88	0.95
10	TTU	43,747	47,439	16.39	17.77	0.20	0.22	0.86	0.93
11	BLU	71,118	77,133	29.08	31.54	0.15	0.17	0.73	0.80
12	ALR	958	3,240	0.33	1.13	0.01	0.02	0.02	0.08
	Timor	*321,266*	*373,546*	*15.74*	*18.83*	*0.13*	*0.16*	*0.58*	*0.71*
13	LBT	1,062	4,646	0.84	3.67	0.01	0.04	0.04	0.17
14	FTI	1,170	7,352	0.65	4.05	0.005	0.03	0.02	0.14
15	SKK	3,603	9,240	2.08	5.34	0.01	0.03	0.06	0.16
16	Ende	4,993	10,658	2.44	5.21	0.02	0.04	0.10	0.21
17	NGD	13,133	22,796	7.98	13.85	0.10	0.17	0.49	0.85
18	NGK	12,667	22,543	8.94	15.91	0.10	0.18	0.50	0.90
19	MTI	2,281	13,883	0.86	5.25	0.01	0.06	0.05	0.29
20	MGR	3,931	11,732	1.88	5.60	0.01	0.04	0.07	0.22
21	MBA	1,649	19,074	0.69	7.96	0.01	0.09	0.04	0.43
	Flores	*44,488*	*121,924*	*2.93*	*7.43*	*0.03*	*0.08*	*0.15*	*0.37*
	NTT	*401,449*	*623,583*	*8.22*	*12.76*	*0.09*	*0.13*	*0.41*	*0.63*

Source: BPS NTT Year 2011 (processed).

arguing. Therefore, efforts to increases the capacity of population in Timor (the primary region) needs to be executed, along with the efforts to the deployment beef cattle in Sumba and Flores (the secondary and tertiary regions). The effort to deployment of beef cattle needs to be executed to harness the potential of land resource in Sumba and Flores. It was also to anticipate the increasing number of population in Timor in the future (given approximately 45.3% of the population living in Timor).

In contrast, analysis based on labor resource (households) showed that economics density in Timor was relatively small. Similarly, economies of density per household or the average ownership of beef cattle was also small. Economic density of beef cattle in Kupang was the highest, because it had the largest beef cattle population, while the economies density of beef cattle in Belu was the lowest, because it had the largest population.

Compared with the potential of land resources, human resource potential was identified as an effective constraint in increasing the capacity of the beef cattle population in Timor, except in Belu. This meant that the current increase in population in Timor was not effectively constrained by the availability of land resources, but it would be effectively constrained by the availability of labor resources in each household. At first glance, limitations of household labor were still dominant in extensive system in Timor where beef cattle grazed on pasture without adequate supervision. In addition, the average number of beef cattle ownership per household (NH) was low and not evenly distributed among the farmers causing the decrease of labor productivity itself.

In particular, in Belu, capacity of the beef cattle population could continuously increase by utilizing the available land resources and labor, but the main constraint was the limited land. Therefore, semi-intensive and/or intensive systems were the strategic option, if all parties want to increase the population based on the capacity of land resources and labor resources. The increase of cultivated land area and crop production would increase by-product as feed. Carrying capacity of cultivated land for food crops was four times of the pas-

Table 3. The maximum potential of land resources (MPLR), maximum potential of householder (MPNH), and capacity of increasing beef cattle population based on land resources (CIBCP-LR) and the number of households (CIBCP-NH) in East Nusa Tenggara Province, Indonesia, per 2011

Regency area	Calculated value (head)			
	MPLR	MPNH	CIBCP-LR	CIBCP-NH
SBA	58,553	40,064	57,972	39,483
SBD	137,133	98,242	134,932	96,041
STE	41,795	22,630	39,648	20,483
STI	123,742	80,796	92,976	50,030
Sumba	*361,222*	*241,732*	*325,528*	*206,037*
SRJ	-	-	-	-
RND	59,424	58,004	48,501	47,081
KMK	3,494	129,960	957	127,423
KPG	205,155	219,868	123,102	121,702
TTS	272,185	212,730	182,765	133,440
TTU	127,040	102,148	83,293	58,401
BLU	191,433	193,944	126,418	132,523
ALR	44,577	82,100	43,619	81,142
Timor	*903,309*	*998,754*	*582,043*	*677,488*
LBT	51,682	54,152	50,620	53,090
FTI	75,839	104,548	74,669	103,378
SKK	76,567	118,982	72,964	115,379
END	39,447	102,012	34,454	97,019
NGD	63,806	53,742	50,673	40,609
NGK	58,787	50,352	46,120	37,685
MTI	77,587	96,666	75,306	94,385
MGR	81,454	108,586	77,522	104,655
MBA	87,530	89,760	85,881	88,111
Flores	*612,699*	*778,800*	*568,210*	*734,312*
NTT	*1,886,626*	*1,976,724*	*1,508,617*	*1,575,275*

Source: BPS NTT Year 2011 (processed).

ture land carrying capacity, so that the efforts to increase production and productivity of cultivated land could encourage the increasing beef cattle population.

Therefore, the participation of all labor in each household, especially farmers with large cultivated land was needed to increase beef cattle population in Timor. Distributing beef cattle to all farmers were an important operational step. The improvement of management skills and raising beef cattle was needed to improve performance business of beef cattle.

Sumba region. Table 3 showed that technical density for beef cattle in Sumba was relatively small. Beef cattle population was concentrated in East Sumba (approximately 86.19%), so that there is inequality of beef cattle deployment in the four regencies. Data showed that pastoral land was lower than the potential area, which was only about 22.73% (BPS NTT, 2011). For all ruminants, technical density increased dramatically. This suggests that although the number of beef cattle in other regencies (except East Sumba) was very small, but the capability of others ruminants (buffalo, horse, goat) was quite large.

Similar with the conditions in Timor, the effective constraint in Sumba was a labor resource. This mean that although land resources in Sumba (especially in East Sumba) have an enormous capacity for beef cattle, the utilization of existing potential is still limited. This could be due to many land resources have not used optimally, to produce grass and crop by-product result from lack of labor availability. The improvement of management skills and good maintenance of beef cattle was needed to improve business performance, so that farmers were able to maintain more cows in each farm household. The government policy for the deployment and distribution of beef cattle ownership to region capability was strategic to increase population. Realization of investment from financial institutions and the private sector required to support government policy.

Southwest Sumba and West Sumba regions were relatively more fertile and had large of cultivated land for feed to increase beef cattle population. The introduction of beef cattle from government and private parties could accelerate the process of ruminant diversification (not only buffalo and horse). The improvement in population structure through the introduction beef cattle program would encourage beef cattle population.

The development of hybrid beef cattle Ongol Sumba (SO) was good due to its suitable habitat (climatic and geographic). In addition, in terms of socio-cultural context, beef cattle become an important part in people's lives inherently. The efforts to increase the capacity of SO in Sumba should be developed inter-sector cooperation from various stakeholders.

Flores region. Table 3 showed that Flores had small technical densities for beef cattle. Beef cattle were concentrated in Ngada and Nagakeo which was about 57.99% of total beef cattle in Flores (or about 6.43% of the total beef cattle in NTT), while the beef cattle population in other areas was very small. A fertile region with large cultivated land area had a greater capacity to increase the beef cattle population. In fact, the existing capacity has not been use optimally, and cultivated land capacity was higher than the natural pasture such as in Timor and Sumba.

Two effective constraints happened in Flores. In general, the seven regencies faced an effective constraint on land resources, while two other districts (Ngada and Nagakeo) faced an effective constrained on labor resource. This means that although the current land resources in seven regencies have large enough capacity of beef cattle, but it will be the first constraint in the future, if the increasing of population based on existing potential.

In contrast, land resources in Nagakeo and Ngada have a large, but the dominant effective constraint was limited labor. Thus, increasing beef cattle in the two regencies will face the labor resources constraint. Improvement of management skills and good maintenance of beef cattle was needed to improve the beef cattle business itself. Therefore, each farmer was encour-

age to have increase beef cattle population and productivity through some programs, that were livestock grants, soft loans (interest rate or duration), and public participation.

In the last 10 yr, the development of beef cattle in Flores has increased significantly, especially in Ngada and Nagakeo. This gives new hope that beef cattle in Flores can develop based on land potential and labor in regencies. The potential by-product of the vast arable land can directly support the beef cattle development.

The Dynamics Capability of the Regional Distribution

The difference value between CIBCP (LR) and CIBCP (NH) illustrated that a greater potential of one resource (while other resources are much smaller), would not be effective to support efforts to increase population in a region (technology and investment is assumed to remain). For example, a region with wide pasture or cultivated land (LR), but has less labor (NH), will be difficult to increase population based on capacity of the pasture. Conversely, if a region with a large population (NH), but has limited land resources, will be difficult to increase population based on labor availability. This condition could be improved if there were changes in technology and/or management of beef cattle.

The top five regencies that most prominent to increase beef cattle capacity in NTT were TTS, Belu, Kupang, Southwest Sumba, and West Manggarai. CIBCP value determined by the availability of specific resources each district, in this case associated with an area of land and amount of labor. Every region in the top-five group generally had a relatively large land area and/or the amount of labor.

The comparison between total areas with the total population showed that Kupang was the biggest area with the smallest number of population, but based on the CIBCP value, ranked the third place. In contrast, Belu was the smallest region with the largest population, but based on the CIBCP value ranked second place. Furthermore, TTS was the second order in terms of areas and population, but based on the CIBCP value this region ranked first.

From these facts, it can be conclude that the value of CIBCP will reach maximum, if there is a balance between the main resources needed to increase the beef cattle population, in this case sufficient land and resources of agricultural labor. This balance will create a

Table 4. Compilation between capacity of increasing beef cattle population (CIBCP) and real population in East Nusa Tenggara Province, Indonesia, year 2011

Seq. No.	Regency area	Population of effective CIBCP (Projection)	Real population of beef cattle (AU)	Difference of capacity (AU)	Regency wide (km^2)	Number of population (People)
1	TTS	**133,440** (1)	**89,420** (2)	44,020 (9)	**3,947.0** (3)	**419,984** (2)
2	BLU	**126,418** (2)	**71,118** (3)	55,300 (7)	2,445.6 (7)	**465,933** (1)
3	KPG	**121,702** (3)	**102,563** (1)	19,139(17)	**5,895.3** (2)	**394,173** (3)
4	SBD	**96,041** (4)	2,201(14)	**93,840** (1)	1,480.5(16)	266,408 (7)
5	MBA	**85,881** (5)	1,649(16)	**84,232** (2)	2,397.0 (8)	211,614(13)
6	MGR	**77,522** (6)	3,931(10)	**73,591** (3)	2,096.4(10)	**274,984** (6)
7	MTI	75,306 (7)	2,281(13)	**73,025** (5)	2,642.9 (6)	244,798 (8)
8	FTI	74,669 (8)	1,170(17)	**73,449** (4)	1,813.2(13)	238,166(10)
9	SKK	72,964 (9)	3,603(11)	69,361 (6)	1,731.9(14)	**279,464** (5)
10	TTU	58,401(10)	**43,747** (4)	14,654(19)	**2,669.7** (5)	214,842(12)
11	LBT	50,620(11)	1,062(18)	49,558 (8)	1,266.4(19)	108,152(18)
12	STI	50,030(12)	**30,766** (5)	19,264(16)	**7,000.5** (1)	233,568(11)
13	RND	47,081(13)	10,923 (8)	36,696(12)	1,280.7(18)	115,874(17)
14	ALR	43,619(14)	958(19)	42,661(10)	**2,864.6** (4)	181,913(14)
15	NGD	40,609(15)	13,133 (6)	27,476(14)	1,645.9(15)	135,294(15)
16	SBA	39,483(16)	581(20)	38,902(11)	2,183.2 (9)	108,644(19)
17	NGK	37,685(17)	12,667 (7)	25,018(15)	1,417.0(17)	126,761(16)
18	END	34,454(18)	4,993 (9)	29,461(13)	2,046.5(11)	238,195 (9)
19	STE	20,483(19)	2,147(15)	18,336(18)	1,868.7(12)	61,370(20)
20	KMK	957(20))	2,537(12)	1,580(20)	160.3(20)	**299,518** (4)
21	SRJ	-	-	-	-	-
	NTT	1,287,365	401,449	885,916	48,853.30	4,619,655

Note: - Figures in parentheses express order from largest to smallest number of the indicator.
- Bold figures are the top five in each indicator.

stable condition to increase beef cattle population in the future. Obviously, changes can occur significantly if system was raised intensifically through good technology, increasing investment, and improving production and pricing policies. Table 4 showed comparison of the real population in 2010 with a projected population based on CIBCP value.

Dynamics of Potential Development Area of Beef Cattle

The dynamics of the potential area showed a change in some of the indicators over time, which in this study shown in the four periods, i.e. 1995, 2000, 2005, and 2010. Values changing on some indicators or variables determined the value of CIBCP were beef cattle population (animal units), spacious land resources (pasture and arable land), and the amount of labor resources (number of farm households). CIBCP value and dynamics of change in priorities for the last 15 yr (i.e. 1995, 2000, 2005 and 2010) was shown in Table 5.

Table 5 showed that the rates of change of capacity differed from each other in the regency, due to different resources in each region. In general, the regions in NTT were more likely to have an effective constraint on the availability of land resources. In detail, about 60.0% of the areas had an effective constraint on the limited land resources and 40.0% of regency had an effective constraint on the limited labor resources. There were some areas with big difference between effective constraints of land and labor resources, and there were some areas that almost equal.

The bigger potential for one of the resources (while other resources are much smaller) will not effective to increase population in the area. For example, large areas of pasture or arable lands with little number of workers is difficult to increase population based on the capacity of the existing pasture. Conversely, big population area with little land resources is hard to increase beef cattle population based on existing labor availability. Improvement in technology and/or management system of beef cattle rising can solve that condition.

General Policy for the Priority Development Area of Beef cattle

Analysis of the population density ratio and beef cattle density obtained some actual specific conditions, thus requiring different problem-solving efforts across the region. The categorization of population and livestock density in each region as well as public policy could implement in each region. Categorization of regency were as follows: dense cattle-dense residents (DC-DR), dense cattle-moderate residents (DC-MR), dense cattle-rare residents (DC-RR), moderate cattle-dense residents (MC-DR), moderate cattle- moderate residents (MC-MR), moderate cattle-rare residents (MC-RR), rare cattle-dense residents (RC-DR), rare cattle-moderate

Table 5. Priority and value of effective capacity of increasing beef cattle population (CIBCP) for beef cattle in 1995, 2000, 2005, and 2010 in East Nusa Tenggara Province, Indonesia

Regency	Seq. No.	Year 1995 (head)	Regency	Seq. No.	Year 2000 (head)	Regency	Seq. No.	Year 2005 (head)	Regency	Seq. No.	Year 2010 (head)	Priority
MGR	1	255,954	MGR	1	337,582	SBA	3	160,730	TTS	1	133,440	I
MTI			MTI			SBD			BLU	2	126,418	I
MBA			MBA			STE			KPG	3	121,702	I
SBA	5	102,857	TTS	4	97,116	TTS	1	193,212	SBD	4	96,041	II
SBD			SBA	3	119,464	MGR	2	186,438	MBA	5	85,881	II
STE			SBD			MTI			MGR	6	77,522	II
FTI	2	127,885	STE			MBA	8	81,399	MTI	7	75,306	II
LBT			BLU	9	61,600	SKK	4	107,001	FTI	8	74,669	II
SKK	3	107,338	KPG	2	119,507	TTU	13	60,689	SKK	9	72,964	II
END	4	105,815	RND			BLU	6	101,908	TTU	10	58,401	III
NGD	6	95,943	KMK			NGD	5	103,781	LBT	11	50,620	III
NGK			SRJ			NGK			STI	12	50,030	III
TTS	11	8,188	TTU	10	54,454	STI	12	62,501	RND	13	47,081	IV
ALR	7	74,925	SKK	5	92,170	FTI	7	97,934	ALR	14	43,619	IV
STI	10	32,591	FTI	6	89,527	KPG	9	72,832	NGD	15	40,609	IV
BLU	9	46,150	STI	12	48,999	SRJ			SBA	16	39,483	IV
TTU	12	7,372	NGD	7	71,342	ALR	10	68,935	NGK	17	37,685	IV
KPG	8	47,421	NGK			END	11	65,357	END	18	34,454	IV
RND			END	8	65,945	LBT	14	55,064	STE	19	20,483	V
KMK			LBT	11	49,099	RND	15	40,587	KMK	20	957	V
SRJ			ALR	13	47,977	KMK	16	1,440	SRJ	21	-	V
NTT		1,012,440	NTT		1,254,781	NTT		1,459,807	NTT		1,287,367	

residents (RC-MR), and regency with rare cattle-rare residents (RC-MR).

In general, the option of beef cattle development policy could be adapted to the conditions of real resources available in the field. The DC-DR region tend to choose alternatives to implement intensification program, which aims to increase the capacity of the limited-capacity-land, and to support more livestock units per hectare. In contrast, the RC-RR region tend to choose alternatives to implement extension program, so that the unused potential land resources can exploit optimally. Description more details about the various combinations of conditions between livestock density and population density, was shown in Table 6.

Timor had empirical evidence about positive relationship between beef cattle and residents. The number of beef cattle in each region related and linked to the local residents. Thus, the distribution policy of beef for family farmer who running semi-intensive and intensive system with a certain minimum amount (e.g. 1–3 ST), was needed to increase the beef cattle population in DC-DR region. In contrast, RC-RR region needed the form of beef cattle distribution policy for every head of family farmers (4–5 ST) who running extensification system. The moderate or intermediate region could have various policies between the two extreme conditions above.

Recommendation of this research are: (a) Types of different livestock development policy are need for a specific region base on actual resources. The policy is highly depending on the potential of resources (labor supply, feed by-product, and feed pastures). For example, the policy in DC-DR region (in Belu Regency) could implement in farm intensification program (on feed crop, breeding, and fattening) and diversification program (on other sources of feed and other kind of ruminant animal). (b) Technically, as a relevant follow-up is the arrangement of the development of beef cattle agribusiness which includes the dynamics of consumption and animal production, deployment of sustainable beef cattle, livestock trading flow control optimum in each region, and appropriate management of production systems.

CONCLUSION

NTT region has large capacity for additional beef cattle up to about 3.2 times that of the current population (based on feed resources and labor), with existing technology, management, and market factor. Regency areas with land resources and large labor generally have a greater value of CIBCP. On the other hand, regions with large land resources but small labor resource (or

Table 6. The general policy of development of beef cattle in each a category of regions in NTT based on the density of residents and beef cattle

Group category	Regency region	General policy of development of beef cattle
DC-DR	BLU (Belu)	• Developing the superior feed crops • Utilize unconventional feed resources of forests, plantations, etc. • Intensification of breeding and fattening • Diversification with the other ruminants
DC-MR	TTS (South Middle Timor)	• Developing the superior feed crops • Utilize unconventional feed resources of forests, plantations, etc. • Intensification of breeding and fattening • Diversification with the other ruminants
DC-RR	-	• Intensification of breeding and fattening • Limited mechanization of beef cattle enterprises or mini-ranch
MC - DR	KMK (Kupang Municipal)	• Not recommended for beef cattle development, as it is the Municipality territory
MC - MR	KPG (Kupang), TTU (North Middle Timor)	• Expanding the use of arable land or pasture resource potential with the a semi-intensive system • Limited mechanization of beef cattle enterprises or mini-ranch
MC - RR	STI (East Sumba)	• Utilize as much as possible of the waste agricultural crops and natural grass • Limited mechanization of beef cattle enterprises or mini-ranch
RC-DR	SBD (Sumba Barat Daya), FTI (East Flores), SKK (Sikka), MGR (Manggarai)	• Expanding the use of arable land and utilize as much as possible of the waste agricultural crops and natural grass
RC-MR	RND (Rote-Ndao), ALR (Alor), LBT (Lembata), END (Ende), NGD (Ngada), NGK (Nagakeo), MTI (East Manggarai), MBA (West Manggarai)	• Expanding the use of arable land or pasture resource potential with the a semi-intensive system
RC-RR	SBA (West Sumba), STE (Midle Sumba)	• Optimizing the use of arable land or pasture resource potential with the extensive system

Notes: Cattle: DC= dense cattle; MC= moderate cattle; RC = rare cattle
Residents: DR= dense residents; MR= moderate residents; RR= rare residents.

vice versa), will have a smaller effective of CIBCP value, depending on the physical resources that are most limited. Priority scale order of development regions is not only dominated by the region with the largest number of beef cattle. Cultivated land area has more dominant effect than the vast grasslands in determining the value of effective CIBCP.

REFERENCES

Basuno, E. 2004. Returns the status of the Nusa Tenggara as a production center of beef cattle. Agricultural Policy Analysis 2: 354-368.

Disnak NTT [NTT Provincial Livestock Office]. 2012. Annual Report of the Animal Husbandry Department of NTT. NTT Livestock Office, Kupang.

Ditjennak [Directorate General of Livestock]. 2010. Blue Print of Self-Sufficient Program in 2014. Jakarta: Directorate General of Livestock, Department of Agricultural RI.

Hadi, P. U. 2012. Manajemen Rantai Pasok Ternak dan Daging Sapi di Nusa Tenggara Timur. Dalam: E. M. Lokkolo (Ed). Bunga Rampai Komoditas Pertanian Indonesia. IPB Press, Bogor.

Hadi, P. U. & N. Ilham. 2002. Problem and prospect of beef cattle breeding in Indonesia. Journal of Agricultural Research and Development 21: 148-157.

Ilham, N. 2006. Socio-economic analysis and strategies for achieving self-sufficiency in meat in 2010. Agricultural Policy Analysis 4: 131-145.

Ilham, N. 2007. Alternative policies to increased GDP growth in livestock subsector in Indonesia. Agricultural Policy Analysis 5: 335-357.

Kameo, D. 2006. Poverties of smallholder farm in NTT. A case study in Regency of Kupang and South Central Timor. In: Analysis of CSIS Year XXV No 1, January-February, Jakarta.

Kariyasa, I. K. 2005. Integration of crop-livestock systems in the perspective of fertilizer subsidy policy reorientation and increase farmers' income. Agricultural Policy Analysis 3: 68-80.

Lole, U. R. 2009. Develop of farm model in East Nusa Tenggara: reliability vs aberration. Scientific Journal "Lingkungan Semiringkai" Research Center for Environment and Natural Resources Undana, Vol 2 No 9, June 2009.

Sutaryono, Y. A. 2008. Forage resources in livestock-cropping smallholder systems. a case study of farmers at transmigration areas of Dompu, West Nusa Tenggara. Med. Pet. 31: 146-154.

Talib, C., I. Inounu & A. Bamualim. 2007. The restructuring of livestock in Indonesia. Agricultural Policy Analysis 5: 1-14.

Winarso, B., R. Sajuti, & C. Muslim. 2005. Economic overview of beef cattle in East Java. Forum Penelitian Agro Ekonomi 23: 61-71.

Yusdja, Y. & N. Ilham. 2004. Review of the policy of development of agribusiness beef beef cattle. Agricultural Policy Analysis 2: 183-203.